SCIENCE AND THE FARMER

DISCOVERIES MADE BY ACCIDENT

BENEFITS FOR ALL

FROM A CORRESPONDENT

In every country of the world primary producers are hard hit. The depression in agriculture may be said to be universal. Some blame agricultural science and agricultural education perhaps with justification because the world production of primary agricultural commodities stands at its present level as a direct result of the advances made in agricultural science during the past 30 years and the dissemination of this knowledge among the farmers of the world.

In the opinion of many people the depression is not due to overproduction but to underconsumption, a very different thing. The purpose of this article is not to argue the case between these two views but to give a very brief account of how researches in agricultural science have brought about increases in production.

The progress has been the fruit of workers in many different fields—botanists, chemists, physiologists, pathologists, bacteriologists, and engineers have all played their part. This work has not been confined to one country, nor yet to one continent. Nearly every civilized country in the world has contributed. Science is international; information won is pooled for the use of all.

BENEFIT FROM THE EMPIRE

We in this country have made our contribution from which other countries have benefited, but we have benefited in our turn from work done not only in the Dominions and Colonies of the British Empire but also from that in every civilized country. It is true that almost every country has its own special problems, but the fundamental principles involved are the same everywhere, and it is remarkable how work on some purely local problem will sometimes provide the clue to the solution of another at first sight far removed from it.

All research falls into one of two groups: first, those researches which have an obviously practical application; and, secondly, but not less important, researches which apparently have no practical application, but which are searches for knowledge for the sake of knowledge alone. The value of the former group is so obvious that its value is sometimes over-estimated at the expense of the latter group. Yet many of the most valuable discoveries from a practical point of view have been stumbled upon by workers who were engaged on problems of pure science.

It is clear that agricultural science has three functions to fulfil. First of all progress depends on the discovery of the research workers; secondly comes the interpretation into terms of practice of this discovery, and, lastly, the dissemination of this new knowledge among the farmers at large. All these are essential if progress is to be made, and the last is not necessarily the easiest. For this farmers are not altogether to blame. They are naturally a cautious race and they have reason to be.

ART AND BUSINESS

Because a thing is new it is not necessarily better than that which it is intended to replace—a common fallacy. Moreover, agriculture is not simply a science. It is a combination of art, science, and business. Much of what was an art has been reduced to an exact science, and more is being so reduced every year, but much still remains an art, and the business side must always remain. The complications that this factor of "business" or economics involves are made clear when it is realized that in spite of the dearly held theories of some of our politicians, the maximum level of output is not necessarily the most profitable. If only it were, how much simpler would be the lot of the agricultural scientist! There is, unfortunately, the law of diminishing returns, which operates at levels that vary with the cost of production and the value of the produce, neither of which is constant or predictable.

From a national point of view an intensified production would be a great advantage. From this standpoint the politician is right. But what about the farmer? He is a business man. He farms for a living. Is there any reason why he should be more patriotic than any other member of the community? It is clear that the technical advice given by the scientist to the farmer must be tempered by economics.

From the mass of work that has been done it is practically impossible to single out certain things as having been the most fruitful. Much of the work has not been spectacular, and it is by an accumulation of small advances that progress has been made. The world clearly stands to benefit more by a universal increase in the average output of all commodities even though it be small, than a really big increase confined to one crop or one country.

PROVISION OF NITROGEN

Perhaps of all the advances that have been made none has so important and world-wide an application as the manufacture of synthetic nitrogenous manure. Nitrogen in the form of nitrate is one of the most important plant foods. Without exaggeration the lack of this particular plant food may be said to be the commonest limiting factor in crop production throughout the world. Four-fifths of the air we breathe is nitrogen, yet nitrogen starvation is one of the commonest of plant conditions, for neither plants nor animals can use atmospheric nitrogen. It is only when nitrogen is fixed that it becomes available to them. Until 20 years ago the world depended mainly on animal excreta and on leguminous plants for its supplies of fixed nitrogen, for leguminous plants, unlike all other plants, have the power of using atmospheric nitrogen. Such other forms of nitrogen as were available were in limited supply and were comparatively costly.

This has now all been changed. At Billingham-on-Tees there has been erected a vast factory where by means of electricity atmospheric nitrogen is fixed and turned out ultimately in the form of sulphate of ammonia, a very valuable and concentrated nitrogenous manure. This is sold at a comparatively low price in this country and is exported as well. Similar factories are to be found in various other countries. The situation as regards this essential plant food has therefore been revolutionized. Science if it has done nothing else can at least claim to have removed from the world any fear of a shortage of a material that is fundamental to its very life.

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